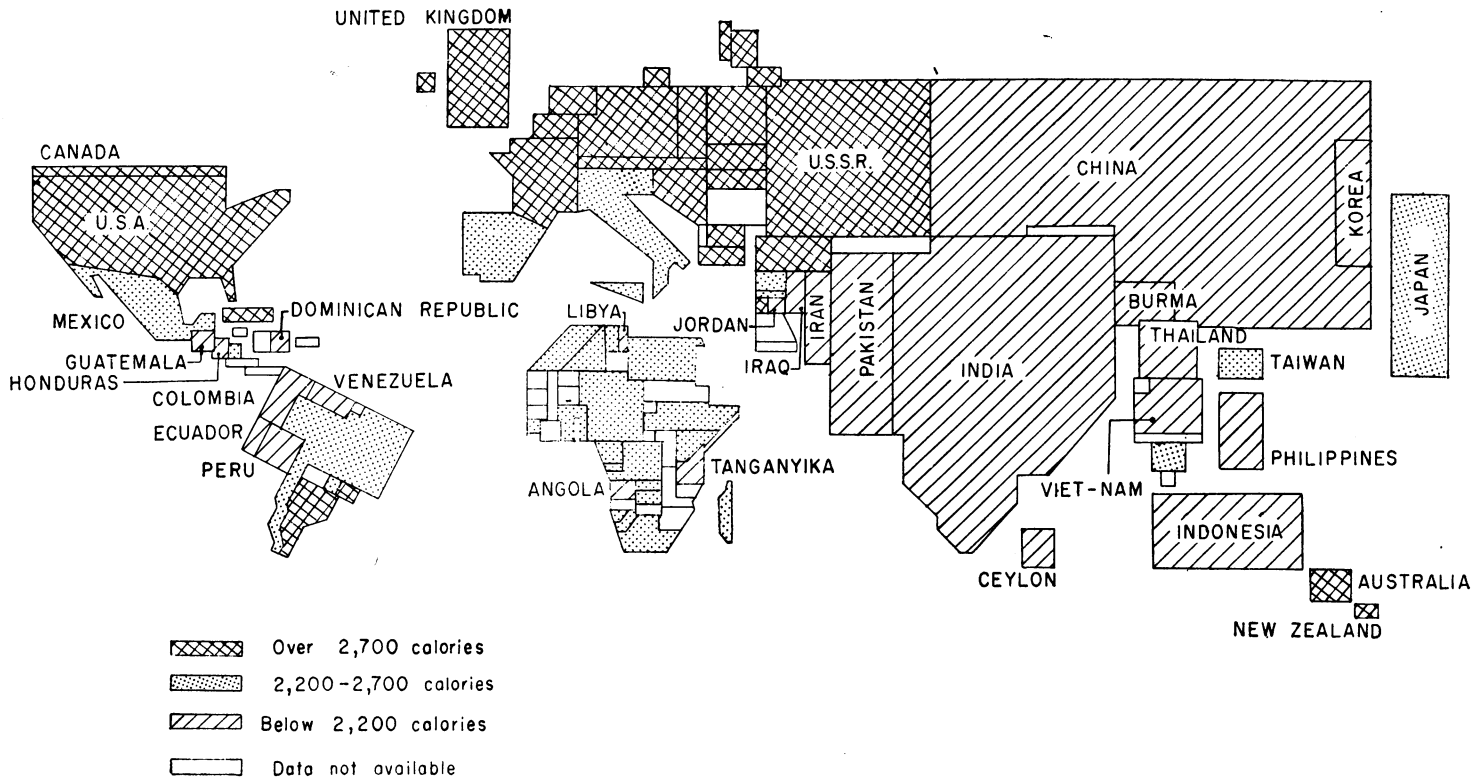

THE DISTORTED SHAPE OF A HUNGRY WORLD

THIS MAP APPEARS strange because each country has been drawn on a scale which shows the number of people living there. Notice the small size of lightly populated Canada and Australia, the comparatively immense sizes of densely-populated Britain, India, Indonesia and Japan. The areas indicated as below 2,200 calories represent people who are likely to be undernourished.

The map is adapted from one which appeared in colour in a *Sunday Times* Supplement. We are grateful for permission to reproduce it here.

SIR JULIAN HUXLEY
M.A., D.Sc., F.R.S.

Education and the Humanist Revolution*

WHAT IS EDUCATION? Dorothy Parker once said that it was casting sham pearls before real swine. But this splenetic outburst is hardly fair, and could only represent the views of a harassed and overburdened teacher in a difficult neighbourhood. My grandfather, Thomas Henry Huxley,[9] once defined an educated man in the following famous passage:

That man, I think, has had a liberal education who has been so trained in youth that his body is the ready servant of his will, and does with ease and pleasure all the work that, as a mechanism, it is capable of; whose intellect is a clear, cold, logic engine, with all its parts of equal strength, and in smooth working order; ready, like a steam engine, to be turned to any kind of work, and spin the gossamers as well as forge the anchors of the mind; whose mind is stored with a knowledge of the great and fundamental truths of Nature and of the laws of her operations; one who, no stunted ascetic, is full of life and fire, but whose passions are trained to come to heel by a vigorous will, the servant of a tender conscience; who has learned to love all beauty, whether of Nature or of art, to hate all vileness, and to respect others as himself.

Elsewhere, in the same address, after enumerating the biased arguments of the politicians, the clergy, the manufacturers and the capitalists, he wrote with deep feeling of education's central mission of enlightenment:

A few voices are lifted up in favour of the doctrine that the masses should be educated because they are men and women with unlimited capacities of being, doing, and suffering, and that it is as true now, as ever it was, that the people perish for lack of knowledge.

But I want to treat education as a social process. For me, education is an organ of man in society, whose basic function is to ensure the continuity and further advance of the evolutionary process on earth by the transmission and transformation of tradition. It exists in rudimentary form in higher vertebrates, but only becomes of major importance in our own species, where it transmits the knowledge, the skills and beliefs, the attitudes and ideas which are necessary for the maintenance, achievement and development of man in society. Much of education in this broad sense is unorganized, acquired through Press and radio and public meetings, or through individual self-education. Here I shall confine myself to organized systems of education (though clearly these can be so planned as to encourage and gear in with various kinds of unorganized education).

Education and Evolution

To look at education in the perspective of evolution is good for many reasons. Firstly, it shakes us out of over-preoccupation with the multitude of specific and immediate difficulties that beset us. Secondly, it provides a necessary corrective to the tendency of our neotechnic industrial civilization to think and plan in terms of quantity rather than quality—a tendency which is having unfortunate effects on education, both on subject-matter (think of the emphasis on the physico-mathematical sciences and technology as against the life and earth sciences and conservation), on curriculum (think of the emphasis on subjects which can easily be examined in), on evaluation (think of the emphasis on examination standards and marking systems) and on methods (think of teaching aids). Finally, while stripping education of much sentimental and idealistic mystique, it gives new dignity and im-

* The ninth Fawley Lecture delivered by Sir Julian Huxley, M.A., D.Sc., F.R.S., on November 22nd, 1962. It is printed here by kind permission of the author and of Southampton University. A shortened version appeared in *Nature*, No. 4862, January 5th, 1963.

portance to the whole educational process, new inspiration for all those engaged in teaching, new clarity to the aims and principles of education.

Education involves the transmission of experience and its results across the gap from earlier to later generations. There are three stages of its evolution, two of them pre-human. In the most primitive, transmission bridges only one generation-gap between parents and offspring. This stage is found most obviously in carnivores like fox or lion, where the young animal, after a period of self-education by play, learns to hunt by accompanying one or both of its parents.

The second stage is marked by the beginnings of tradition, a set of social habits peculiar to a single population, which endures through a number of generations. Rudiments of such proto-tradition are found in various social mammals (and perhaps a few birds); but the most striking example is that of the Japanese monkey, *Macaca fuscata*, summarized by Dobzhansky in his book, *Mankind Evolving*:[3] in this species, each monkey colony or social group has its own traditional food-habits, but these are occasionally modified by adventurous innovations, which take two or three years to spread through the group. Here we see how even a proto-tradition can evolve by incorporating new elements. But it involves no real educational system—no special arrangements for educating the young animals in and through the tradition.

The third stage is found only in man. It is the stage of a truly cumulative tradition, based on conceptual thought and communicated by artificial or arbitrary symbols that have to be learnt, as well as by imitation and by simple signs that are genetically determined. As the tradition grows more complex and its symbolic system of communication correspondingly more elaborate, organized education becomes necessary as part of the machinery for its transmission down the generations.

Cultural Evolution

Cumulative tradition based on conceptual thought and true symbolic language provides man with a second mechanism of continuity and change—in other words of inheritance and evolution—superposed on the primary genetic-evolutionary mechanism of his chromosomes and germ-cells, and often overriding it. As a result, man has moved across a critical threshold, the threshold from the biological to the psychosocial phase of the universal evolutionary process. In this new phase, evolution is manifested primarily in cultural change, secondarily and less obviously in genetic change in constitution. To take one example, only negligible genetic change in man's intelligence or other capacities have taken place since the Neolithic period (and quite possibly since Cro-Magnon times), but almost incredible changes in his cultural apparatus and achievements—religion, art, science, law, technology, literature, social organization and the rest.

One of the novel characteristics of the psychosocial phase is its new tempo of change. Not only is cultural evolution much faster than biological, but it shows acceleration. In the lower Paleolithic it took perhaps 100,000 years to effect a major cultural change; in the early civilizations a few hundred years; and now barely a single decade—bringing new problems for education.

And yet, in spite of this new speed of change and of the astonishing new achievements that it has permitted, we must remember that man is an extremely recent phenomenon. Man as a hominid in the broad sense, including the ape-man Pithecanthropus and his immediate ancestors, cannot be much more that a million years old, and a million years in the perspective of life's two and three-quarter thousand million years is less than half a minute out of a twenty-four-hour day; while the whole of civilized man's history has all been compressed within one tick of the cosmic clock. What is more, he is a sadly incomplete phenomenon. He is an unfinished type, needing a great deal of improvement before he can qualify as a satisfactory product of evolution and do his cosmic job properly. And human individuals are all too obviously unfinished when they are born into the world: they need radical improvement before than can qualify as satisfactory social beings and perform their functions in life adequately. And their improvement as individuals, as well as the improvement of man as a type, depends to an important extent on the improvement of education.

Improvement during biological evolution is manifested in the improved construction, work-

ing and behaviour of animals and plants. As Darwin pointed out so clearly in his great book, it is the inevitable result of the blind and non-purposeful agency of natural selection, which operates via the genetic mechanism of transmission and transformation, the gene-complex in the chromosomes.

Improvement during human evolution, on the other hand, is manifested primarily in cultural terms, in the organization, workings and achievements of human societies and cultures. It is brought about primarily by the collective agency of psychological and social forces which we may conveniently label as psychosocial pressure, and this operates via the psychosocial mechanism of transmission and transformation, which includes tradition in the broad sense, the diffusion of ideas and cultural products, and, of course, education.

We are only beginning the detailed scientific exploration of these basic agencies and mechanisms of human evolution, but some broad principles are emerging. Those most relevant to my subject are these. First, that it is the general idea-system, the ideological pattern of ideas and knowledge, values and beliefs, which essentially characterizes human societies and cultures, and indeed is the prime determiner of their social organization, their material substructure and their achievements. The psychosocial process is a unitary one, simultaneously and indissolubly both material and mental, in which the material machinery and the social structure are constantly reacting back on the ideological pattern. But mind dominates the process, and it is the ideological pattern which is primary.

Secondly, with the extension of our understanding of the psychosocial process now and in the past it is becoming clear that everything in human history which deserves the title of advance or progress, every improvement or hope of improvement of the human lot and man's hard destiny, has sprung from the discovery and dissemination of new knowledge and new ideas.

Let me clarify this point a little. I am using *idea* in a broad and loose sense to cover beliefs and values as well as general and scientific concepts. Ideas are real phenomena, part of man's psychosocial equipment. Before new factual knowledge can become effective it must be organized, incorporated in, or related to an idea. Ideas, of course, grow out of our experiences, both external and internal, but differ a great deal in what may be called their scientific or objective validation. Where detailed and scientific validation is meagre or not available, ideas can still exact strong psychosocial effects: for instance, the idea of monotheism, or of personal salvation through religious faith or sacred ritual. But in the long run those ideas will prevail which are scientifically validated and are backed by a mass of established factual knowledge.

The psychosocial process is a cybernetic one, full of feedback mechanisms, so that new ideas, and the new knowledge of which they are the vehicles, not only must operate within the contemporary idea-system, but will modify it. Thus the basically new idea of domesticating food-supply by growing crops interacted with the general ideas of the time and became part of a general ideological framework concerned with agricultural prosperity, fertility ritual and sacred priest-kingship, which in turn modified social structure.

Major advance in evolution takes place in a series of steps, by means of a series of dominant types, each new one embodying an improved and therefore successful pattern of organization, with the older ones often persisting in an inferior position and reduced numbers. During biological evolution, what is improved is bodily organization—of structure, function and behaviour. A fish has a higher organization than a worm, a worm than a jelly-fish: during the last 300 million years, amphibians, reptiles, mammals and finally man succeeded and largely replaced each other as dominant types of land life. But in human evolution, what is improved is psychosocial organization—the organization of thought and beliefs, of knowledge and ideas, and of the cultures and social systems related to them. The industrial national type of organization is higher than the literate barbaric, that in turn higher than the illiterate tribal. Magic, myth, polydaemonism, monotheism, science, succeed and largely replace each other as dominant patterns of human thinking.

The knowledge explosion of the last hundred years since Darwin is giving us a new vision of our human destiny—of the world of man, and of man's place and role in the world. It is an evolu-

tionary and monistic vision, showing us all reality as a self-transforming process. It is a monistic vision, showing us all reality as a unitary and continuous process, with no dualistic split between soul and body, between matter and mind, between life and not-life, no cleavage between natural and supernatural; it reveals that all phenomena, from worms to women, from radiation to religion, are natural.

It will inevitably lead to a new general organization of thought and belief, and to the development, after centuries of ideological fragmentation, of a new and comprehensive idea-system. The Middle Ages had a comprehensive vision and a comprehensive idea-system, and so does Marxist Communism to-day; but neither was founded on comprehensive knowledge. To-day is the first period in history when man has begun to have a comprehensive knowledge of stars and atoms, of chemical molecules and geological strata, of plants and animals, of physiology and psychology, of human origins and human history. The knowledge is highly incomplete; new and surprising discoveries are being made every year and will continue to be made for centuries to come. But it is comprehensive, in the sense of covering every field, every aspect of reality.*

Its upshot is clear. Man is not merely the latest dominant type produced by evolution, but its sole active agent on earth. His destiny is to be responsible for the whole future of the evolutionary process on this planet. Whatever he does, he will affect that process. His duty is to try to understand it and the mechanisms of its working, and at the same time direct and steer it in the right direction and along the best possible course.

Evolutionary Humanism

This is the gist and core of Evolutionary Humanism, the new organization of ideas and potential action now emerging from the Humanist Revolution of thought, and destined, I prophesy with confidence, to become the dominant idea-system of the next and critical phase of psychosocial evolution.

What are the implications of this new pattern of thought and belief? In the first place, the operation for which he has sole responsibility is a natural one, and he must not sit back and expect supernatural aid. Its overriding aim so far as I can see, must be defined positively, in terms of fulfilment and achievement—greater fulfilment (and therefore less frustration and misery) for more human individuals, interlocking with fuller achievement (and therefore less muddle and failure) by more human societies. And this can only be secured by a better understanding and a fuller realization of human possibilities. Further, in pursuing this aim, man must remember that he is a part of nature, and must learn to live in harmonious symbiosis with the environment provided by his planet, a relation of responsible partnership instead of irresponsible exploitation. If he is to make a success of his job as guiding agent for evolution, he must abandon the arrogant idea of conquering and exploiting nature; he must co-operate and conserve. Here, too, he must set himself to understand possibilities and try to realise them more fully and fruitfully, but here they are the possibilities not of human, but of external nature.

If this new view of human destiny is essentially correct, then clearly our educational system and methods must come to terms with it, for, after all, education must be concerned with man's place and role in nature, and its raw material is man himself. As I wrote in my Huxley Lecture[6] twelve years ago:

> The most important, if not the most urgent, task of our times is the development of a new set of integrative, directive and transmissive mechanisms for human societies and for their continuity down the generations. These must include systems in which the community at large can share—systems of shared interpretation, shared belief, shared activity and shared faith.

A New Educational System

Most educational systems are highly resistant to change, because they are controlled by dogmatic religious organizations, or because they are closely linked with the established social order, or just because of inherent conservatism. To-day we need a radical change of system; and clearly

* I should except the field of so-called parapsychology. If the existence of telepathy, ESP, and the rest is firmly established, their scientific investigation could well lead to a revolution in our thinking about the nature of mind. But this is still quite hypothetical, and meanwhile it is our obvious duty to work out the implications of the very comprehensive knowledge we already possess.

the new system must itself be evolutionary, not change-resistant but change-promoting. It must transform as well as transmit. In part, this can be achieved through appeals to morality—by showing growing boys and girls a comprehensible but high aim in life, making them understand the moral duty of helping and guiding the evolutionary process in a desirable direction. But preaching is not enough: something more practical is needed. If, as I maintain, our essential aim be greater fulfilment, then the next step in psychosocial evolution must assuredly be from the Welfare State towards a Fulfilment Society. A humanist educational system will not only put the idea of the fulfilment society before children, but will provide them with opportunities for actual personal fulfilment in every possible way —through knowledge (I remember Bertrand Russell once exclaiming, "How nice it is to *know* things!"); through disciplined adventure on mountain or sea; through expeditions and travel; through painting and acting and making music; through enjoyment of nature and beauty; through fun and games; through inner peace; through study projects and organized discussions; through responsible participation in group activities. It will have a curriculum of experience as well as a curriculum of subjects.

In adapting our old educational system to our new vision, a lot of cargo will have to be jettisoned—once noble but now mouldering myths, shiny but useless aphorisms, utopian but unfounded speculations, nasty projections of our prejudices and repressions. Thus, man was not created in his present form a few thousand years ago. Mankind is not descended from Adam and Eve, or any other single couple. Children are not born with a load of original sin derived from the Fall, nor with a *tabula rasa* of a mind ready to be inscribed with whatever message educators wish. There never was a Golden Age, nor a Noble Savage. There are no pure races, nor any Superior or Master Races. Mind and Body are not separate entities. There are no Absolutes of truth or virtue, only possibilities of greater knowledge and fuller perfection.

On the contrary, mankind is a single species, which originated from a population of ancestral apes about a million years ago. His evolution since then has been marked by the increasing complexity and improvement of his material, social and psychological organization, but at the same time by the increasing magnitude of his crimes and follies. Children are not a set of uniform *tabulae rasae* but highly complex and varied psychosocial organisms engaged on the extremely difficult task of developing into satisfied and satisfactory members of a social community.

The educational process has to cope simultaneously with several distinct problems—the imparting of knowledge, practical and theoretical; the learning of skills and social habits; the transmission of traditions and beliefs, religious and secular; the formation of character and personality; moral as well as intellectual development; and the crucial passage from childhood to responsible adult life.

In tribal societies, there is nothing that can be called a curriculum. Children gain the knowledge they need for the practical activities of life by watching and imitating the adults and by actual participation. Punishment is rare. What may be called their theoretical instruction, in tribal myth and morality and in forms of adult behaviour, is imparted by selected elders, often with the aid of esoteric and awe-inspiring ceremonies. This takes place during a special period of preparation, culminating in a painful and frightening ordeal which usually includes sexual mutilation. There is no examination to test their knowledge, only an ordeal to prove their adulthood; no certificate to frame and cherish, only the fact of acceptance as full members of the tribe.

Things have changed since then. But we still inflict a painful and frightening ordeal on our children, in the shape of a whole series of examinations; and we still celebrate their successful survival of these ordeals by ceremonial activities, most elaborately by the solemn pomp of university commencements and degree days. Most psychiatrists, I am sure, would agree that one important reason for the stiffness of examinations is psychological—the subconscious desire of the adult to revenge himself for past ordeals by subjecting the young to the same unpleasant trials to which he himself was subjected: and assuredly the gorgeous robes of the academic procession are worn not only to impress the community gathered for the occasion, but as a permitted outlet for donnish egos (it certainly was so for

mine!). And yet it is still true, as Professor Elvin[4] has pointed out in his chapter on "An Education for Humanity" in *The Humanist Frame*, that a tribal boy's education may be a better preparation for life in a tribal society than is our education for life in our vaunted technological society.

There is need to-day for drastic change. Education must come to terms with Humanism over its curriculum, over its relations with society, and over its methods of fostering the development of personality.

As regards curriculum, the solution is, in principle, simple. The advance of knowledge has at last given us a unified or unitary picture of phenomenal reality: clearly the curriculum must reflect this unity and itself become unified instead of consisting of a number of unrelated fragments called *subjects* or *activities*.

Simple in principle, but not so simple in practice! The first difficulty is a quantitative one—that the mere growth of knowledge, not only scientific but also historical and sociological, is too large for any single curriculum to unify. However, the prime function of education is not to impart the maximum amount of factual information, but to provide comprehension, to help growing human beings to a better understanding of the world and themselves. And for this we need what may broadly be called *ideas*.

Ideas in this broad sense are mental machinery for dealing with bodies of experiential fact, the necessary tools of comprehension. Readers of Helen Keller's autobiography will remember the dramatic moment when the deaf, dumb and blind child suddenly realised that "everything has a name". This is the basic idea underlying human language and human thought; and for her it was the master key which unlocked her latent understanding. Ideas can facilitate understanding in boys and girls during their education just as much as in scientists in their research or professional men in their careers. But they must have a sufficiency of facts to work with: in education, the child must be provided with the right mixture of facts and ideas.

As with material machines, some ideas are better than others—they can handle more apparently disparate phenomena, can bridge larger gaps, can simplify greater diversity. Thus the single idea that the planets move round the sun in ellipses relegated all the fantastic ptolemaic machinery of cycles and epicycles to the scientific dustbin, and with one stroke simplified for all later generations the whole working of the solar system. Again, the abandonment of the scholastic idea of two conflicting principles of heat and cold in favour of the scientific idea of a single scale of temperature, was (and still is) a great aid to our understanding of physical phenomena.

Evolution—or, to spell it out, the idea of evolutionary process—is the most powerful and the most comprehensive idea that has ever arisen on earth. It helps us to understand our origins, our own nature, and our relations with the rest of nature. It shows us the major trends of evolution in the past and indicates a direction for our evolutionary course in the future.

Since the process of evolution involves the constant inter-adjustment of organisms with their environment, the evolutionary idea gives us a new view of our relations with our planetary habitat and its resources, and with the other organized life-communities with which we share it. It gives us a new perspective in time, and a new sense of universal interrelatedness. Above all, it unifies our knowledge and our thought. We are part of a total process, made of the same matter and operating by the same energy as the rest of the cosmos, maintaining and reproducing ourselves by the same type of mechanism as the rest of life, unique only in having been pushed further along life's general road to reach the psychosocial stage.

Thus the evolutionary idea must provide the main unifying approach for a humanist educational system, and evolutionary biology could and should become a central or key subject in its curriculum. As I said in an address to American high school teachers at the Darwin Centennial Celebration at Chicago in 1959:[7]

> Not only is evolution the necessary background for any proper understanding or exposition of biology; but I, with many of my colleagues, feel strongly that biology is the necessary basis for understanding ourselves and nature and our place in nature.
>
> Evolution is important for understanding ourselves as animal organisms, for instance in connection with food, health, and disease. Evolution is essential for understanding ourselves in relation to our environment and other organisms in that environment—in other words, for understanding human ecology. Evolution is also essential for understanding ourselves as

organisms which develop—in other words, for understanding human embryology and ontogeny; the most spectacular phenomenon in life is the development of adult human beings from microscopic bits of nucleated protoplasm. Embryology links up with an understanding of human reproduction and with an understanding of that rather difficult but important subject, the genetic basis of our life. Finally, evolution helps us to understand ourselves as unique organisms equipped with a new *method of evolution* —cultural evolution—based on the cumulative transmission of experience through language and symbols.

Embryology, reproduction, and genetics reveal all sorts of extremely exciting facts. "Exciting" is the right word, for knowledge of these facts does excite interest and wonder in our minds. I use the word "wonder" deliberately, for I believe that to excite wonder and interest in the variety and richness of life is important in education. So far as I can see, biology is the best scientific subject for eliciting a sense of wonder and an immediate interest in the strange, the unusual, and the exciting. Biology may not stir the interest of all the mechanically minded, but it does arouse the interest of a great many children, probably the majority.

Biology has the further advantage that through it you can enlist the born naturalist as well as the born laboratory experimenter—the boy or girl who is interested in the variety and the wonder of things as they are, as well as the child who is interested in finding out how they work. It is no coincidence that all the great evolutionists have had an interest in natural history and that most of them started as naturalists.

Too often, perhaps especially in the U.S.A., owing to religious pressure or plain conformist timidity, evolution is not allowed into the curriculum, or is admitted under some specious alias like "racial development"; whereas in the U.S.S.R., in spite of the setback due to Lysenkoism, evolution occupies an important place in education. But for further facts and ideas on this, I must refer my readers to Professor H. J. Muller's admirable article, "One Hundred Years without Darwinism are Enough".[11]

Ecology

Evolutionary biology provides us with another unifying idea of the greatest importance—the ecological idea. Ecology is scientific natural history; it is the science of relations *par excellence* —relations between organisms and their environment, and of organisms with each other. It helps us to understand how life makes a living.

It deals with what is commonly called the balance of nature. But its central concept is that of the organized ecological community—a patterned assemblage of different vegetational, animal and microbial types, inter-adjusted to give optimum utilization of the resources of a particular habitat. If the dynamic pattern of relations is interfered with, the entire habitat and the ecological community living in and on it may be damaged. The most obvious case is deforestation with consequent erosion; another is the introduction of domestic cattle coupled with reduction of wild herbivores, which may disrupt the ecological pattern of savannah and turn it into desert. From earliest times, man has been interfering with more and more natural habitats and has exploited their resources more and more pitilessly. He has already converted vast areas of once fertile land, in the Mediterranean and the Middle East, in China and in India, into arid semi-deserts or treeless infertility. Now that his exploding population is subjecting more areas to ever more drastic and more technologically efficient exploitation, he is in danger of becoming the cancer of the planet instead of its guide.

In the educational systems of underdeveloped territories, children should be introduced to science by the biological way of ecology and physiology and their applications in conservation and health, not by way of physics and chemistry and their applications in technology and industry. And in all countries, ecology is essential as a basis for good land use and productive development.

Man lives in a triple tier of environments, material, social and psychological. Ecology in the customary sense deals with man's relations with the forces and resources of external nature. Social ecology deals with man's social relations, both within and between human societies. And what we may call psychological ecology is concerned with man's individual and collective relations with the forces and resources of his inner nature and the environment of ideas, beliefs and values which he has created and with which he has surrounded himself.

A New Curriculum

How should the new humanism's evolutionary approach take effect in education? The overriding need is that it should put an end to the fragmentation of the present system. Education must be comprehensive, in dealing with every

aspect of life; it must also have a unitary pattern, reflecting the unity of knowledge and the wholeness of experience. It must attempt to give growing minds a coherent picture of nature and man's role in it, and to help immature personalities towards integration and self-realization.

To give a coherent picture we need, in the first place, an integrated curriculum instead of a patchwork, a curriculum focused on the pattern of man's relations with nature and the psychosocial process, instead of on separate aspects of nature like physics or botany, and on separate aspects and activities of man like literature or history.

Once we begin to think along these lines, we find that different "subjects" can link up with and reinforce each other. Physiology links up with chemistry and heredity, ecology with geography, soil science with agriculture and meteorology. The study of development leads on to biological evolution; evolution, in turn, links back to geology, astronomy and cosmology, and on to man's origins, to archeology and human history. History, in turn, links up with economics, social studies and citizenship. Art and architecture, law and morality, science and technology, are best treated as functions of man in society: they, too, evolve and accordingly profit by being treated historically, not merely as separate and complete packages of facts and principles.

Just how to plan and introduce such a curriculum is a matter for the educational profession. Of course, it will not be easy, in face of the competitive claims of traditional subjects and established university departments on the one hand, and on the other hand of the portentous growth of factual knowledge and theoretical scaffolding, notably in the sciences, but also in the humanities. It will mean scrapping a great deal of dead wood and dead weight: it will mean some sacrifice of specialists' *amour propre* and curricular claims: and it will take much ingenuity and a great deal of goodwill. But it must be done, and I am sure that it can be done.

Indeed, the process is already beginning. Medicine is throwing overboard a mass of unnecessary anatomical detail: universities are introducing first-year courses of general studies: sixth forms are taking steps to correct earlier over-specialization: the American Institute of Biological Sciences[1] (and see Hurd[5]) has worked out a remarkable integrated curriculum for High School biology, embodying many new ideas and methods, and the Gulbenkian Foundation is doing something similar in this country. But these are sporadic and isolated attempts. The task will only be satisfactorily achieved when we realize that, here as elsewhere, unity brings strength. In a properly unified curriculum, separate subjects will not compete for prestige and place, but can reinforce each other.

This could give a new dynamic to the educational process. Children in general have a natural interest and curiosity: they want to know more about this strange and wonderful world, about human life and how to live it, and to find out what it all means. If their education is designed to help them in this instead of setting up a number of hurdles in their way, they will enjoy it, and will become willing co-operators instead of reluctant or obstructive victims. And education will acquire a new social dynamic: from being merely a preparation for life, it will become an integral part of life, an instrument of man's evolution.

The other prerequisite for a humanist education is that it should help children to realize more of their capacities, and to develop into well-integrated personalities. For this, in addition to the integration of subjects, we need an integration of activities. The educational system must set itself not merely to surmount obstacles—to bypass frustration, to overleap apathy, to resolve conflict—but to provide opportunities for active living, for satisfying achievement, for feeling significant, for fulfilment. This again will not be easy. Apart from difficulties of staff and facilities, and the difficulty of linking school life, home life and social life, there is the difficulty of time. Once more, however, it not only must, but can be done.

Here again, unification leads to mutual reinforcement. So-called extra-curricular activities can be made to serve curricular ends, and *vice versa*. Children, in general, have a natural desire to achieve, to exercise their capacities, to count for something in life. If they find that their education is designed to help them in this instead of treating them as temporary inmates, to be dealt with by a combination of bribery and punishment, they will become willing participants.

A further important implication of the evolutionary-humanist approach is that the mind-bodies the educator has to deal with are not all alike. Far from it! They are extremely diverse: in technical terminology, they exhibit a high degree of variance, both genetic and non-genetic.

Environment and Heredity

Unfortunately, ideological warfare between the environmentalists and the hereditarians is still rampant over all the broad territories of the social sciences, including the domain of education, with the environmentalists still maintaining a vigorous offensive campaign. In order to bring the two parties together, the biologist must point out that their dispute is as silly and nonsensical as that between the Bigendians and the Littlendians in *Gulliver's Travels*. The simple and fundamental fact is that neither environment nor heredity is the more important. Both are necessary: and all characters of all organisms are the result of their joint effect. When organisms differ, whether children or chrysanthemums, their differences may be due either to differences in environment—the conditions in which they have grown and developed—or to differences in heredity—their genetic outfit of chromosomes and genes. But the share of either party in the combined operation may differ markedly in magnitude. Thus, the share of genetic determination is high in mammalian hair- and eye-colour, in human colour-blindness and various forms of mental defect, while that of environmental modification is high in size in flowering plants, or health and physique in human beings. One of the most striking effects of the last war in Britain was the notable improvement in the physique and mental energy of children, especially in the lower income brackets, due to the special rations of milk and vitamins that they were given—and this, of course, has had obvious implications for their education.

If a diversified population is made genetically uniform, as when man makes pure strains of dogs or wheat by inbreeding and selection, more and more of its visible variation will be modificational, due to differences in the environment. Conversely, if its environment is made more uniform, as when an unselected strain of plants is grown in carefully controlled conditions, more and more of any visible variation will be genetic in origin.

All these points are highly relevant to our subject. Thus, it is no good training a colour-blind child as a painter or a signalman, or trying to give mental defectives the same educational treatment as normal children.

Perhaps the most surprising recent modificational change in man has been the secular trend towards earlier maturity, summarized by Dr. J. M. Tanner in his book, *Education and Physical Growth*,[12] which has been going on in Western countries for over a century. The onset of puberty, as measured by the age of girls at menarche, has been advanced by some four months every decade, from over seventeen years in 1850 to about thirteen years to-day. This is correlated with a marked acceleration of growth. During every decade of the seventy years since systematic measurement was undertaken, Western adolescents have become bigger and heavier by about one inch in height and four pounds in weight; and maximum stature is now achieved by the age of sixteen to seventeen in girls and eighteen to nineteen in boys, as against nearly twenty-five in 1850. Whatever its cause (which must certainly be sought in environmental factors, such as nutrition and healthy upbringing), this trend has various interesting consequences for education. Thus, boys' schools are faced with a shortage of trebles for their choirs; and an average boy of fifteen is likely to be taller and heavier than his woman teacher, and is pretty certain (on the basis of Kinsey's findings) to have stronger sexual urges. And the average girl of fifteen is now physiologically and psychologically a woman. The adolescent crisis, with all its problems, has been shifted to an earlier age, and educational systems must adjust themselves to this fact.

Genetic Differences and Education

Then there are various kinds of genetic difference for the educational system to cope with. There are large quantitative differences in general intelligence, from potential genius to mental defect. There are also large quantitative differences in the genetic rate of mental development, notably between quick learners and rapid developers on the one hand and slow learners and maturers on

the other (this, of course, has nothing to do with modificational changes in rate, such as the trend to earlier maturity I have just discussed). More research is needed to determine how far rapid learning is correlated with general genetic intelligence and with high final performance, and whether slow learning may not sometimes give more solid later achievement; but clearly our educational system must take account of these differences.

There are also qualitative differences in the way children's minds handle the raw materials of experience,* notably between visualizers, auditory types, concrete manipulators, and abstract verbalizers: the traditional verbal type of education is not very good for visualizers. Then there are differences in creativity and in the capacity for absorbing and regurgitating academic knowledge. The two are not by any means always strongly correlated—indeed, a recent American study has come out with the sweeping assertion that "the class standing of a student has no correlation with his performance in later years", and that the U.S. educational system, based as it is on scholastic achievement, may actually be eliminating some of the best creative talent.

And there are psychosomatic differences, of anatomy and temperament. After Sheldon's work, not even the most aprioristic theorist could expect that a skinny ectomorph would react to the educational process in the same way as a comfortable endomorph with perhaps double the ratio of guts to muscle and a radically different pattern of hormones being squirted into his bloodstream.

The problem is how to be educationally fair to the whole range of these and other variant psychophysical types. Here, as in so many fields, the abnormal may shed light on the normal. Let me give two examples of abnormality and how society can deal with it. Myopia—short-sightedness—is mainly genetic in origin: in a form severe enough to be a handicap in ordinary life if uncorrected, it occurs in well over 1 per cent of human children. It may have been of selective value during early stages of man's history, when fine craftsmanship was needed and craftsmen were kept out of the fighting; but in the modern world it is a severe handicap. However, the modern world has found a way to circumvent the genetic handicap, by correcting the defect with spectacles: by this means the abnormal is brought within the range of the normal.

My second example concerns schizophrenia. This disordered condition of mind, which all too often leads to certifiable insanity, affects nearly one in every ten of all human beings, in every country and in every type and level of culture. Recent work shows that it almost certainly has a genetic basis, and is due to a metabolic error which (among other things) causes the discharge into the blood of an abnormal compound related to adrenalin. This interferes with the working of a very important bit of the brain's machinery for building up the chaos of sensations into an orderly system of perceptions. The confirmed schizophrenic's perceptual world is a disorderly one, not unlike that into which a normal person makes a brief entrance by way of mescalin or lysergic acid.

The educational relevance of this is becoming evident. The genetically schizoprone child begins to manifest overt schizophrenia when the disorderliness of his perceptual world throws him thoroughly out of gear with the ordered "normal" world of his fellow human beings and his society. As one might expect, this usually happens during the adolescent crisis. Psychiatrists are busy devising chemical tests for the schizophrenia-provoking compound in the blood urine and psychological tests for its effects on the percept-building functions of the brain. These tests could best be carried out in the school. And then the schizoprones could be given special educational treatment designed to correct their defective picture of the world and reconcile it with that of their normal fellows. They need corrective spectacles for their defect of inner vision, as myopic children need them for their defect of external vision. For many, perhaps most of them, this should not be too difficult. Meanwhile, the possibility of lifting the heavy burden of schizophrenia from the shoulders of humanity is a notable challenge to the educational profession.

The general challenge of human diversity remains. Man is the most diverse and variable of all organisms—variable anatomically and physiologically, intellectually and temperamentally,

* For a general discussion of this subject, see Huxley, 1962.[8]

genetically and environmentally. And a large degree of diversity is a source of strength to human societies, especially to high civilizations. Successful psychosocial evolution demands a variety of gifts, temperaments and talents. A humanist society needs men of action and men of thought; scientists and artists; brain-workers and labourers; saints and policemen; adventurers and stay-at-homes; eccentrics and established civil servants; leaders and led.

It would be a good thing if the numbers of the too abnormal and the too defective could be reduced, those of the more intelligent and more gifted increased; and perhaps one day eugenics will get busy on this.* Meanwhile, the problem is how to utilize the existing and potential diversity of people to the best advantage of society and of themselves. As Dwight Ingle has written, individuality must be a parameter of the educational process.

The Texan anatomist, Roger Williams,[16] who has done more than anyone else to establish the full range of man's anatomical and physiological diversity, has proposed *Free but Unequal* as the motto of a modern society. Freedom in inequality is a good basis for an educational system to work on: but as a goal for it to work towards, I would suggest *Varied Excellence.*

In any case, educationists must assuredly struggle against conformism and must resist the imposition of all dogmatisms, including their own. They will remember that cultural and individual diversity is precious in itself, and will strive for vivifying variety and against monotonous mediocrity. They will try to ensure that the more gifted children are not bored and frustrated by being kept back to the level of the average, the less gifted not made to suffer by being pushed beyond their capacities. They will try to provide a range of opportunities to meet their pupils' range of aptitudes. But they will hold fast to the humanist vision of variety in unity, and will endeavour to provide a common ground of thought and action, a unitary vision and framework of ideas which all human variants can share.

One point deserves special consideration. The increasing complexity of modern societies demands an increasing number of men and women of great ability and high competence to run them. It should be a prime duty of our educationalists to meet this demand. For this, genetics and education must join hands. We need a comprehensive selection system to catch as many potential geniuses and top people as possible, and, once caught, we must give them an education designed to help and permit them to realize their capacities to the full. Failure to do this will lead to a running down of national efficiency and national achievement. It will also be a lamentable waste of that most valuable of all human resources, mental and spiritual power, and will prevent many potential geniuses from developing their precious talents.

In doing justice to human variety, educationalists will be accused of encouraging an élite, and of aiding new class differences. That must be faced. Nature is not egalitarian; societies must always be stratified in some way; and, whether you call them an élite or anything else, outstanding people are needed at the top.

Human Development

Since education sets out to promote the right development of human beings, a proper understanding of the developmental process is important both for educators and for their political masters. Development is a natural process and must be studied as such, not in the abstract or scholastic terms of some presumed intrinsic vital principle or ideal purpose, nor merely in terms of its elements and origins, real of postulated. In regard to human (and animal) behaviour, the reductionists are still very vocal. Orthodox psychoanalysts spend most of their time searching for origins, overzealous behaviourists and neurologists proclaim that mind does not really exist or is merely an epiphenomenal resultant of matter, the Skinnerian school asserts that nothing but learning is of much importance in behaviour.

We must beware of all such "nothing-buttery". Whenever anybody says or implies that something is "nothing but" something else, or is explicable "merely" in terms of its elements or origins, we can be quite sure that he is wrong. In opposition to *reductionism* I suggest *eductionism* as a rallying cry to constructive thought. It

* See my Galton Lecture, "Eugenics in Evolutionary Perspective" (Huxley, 1962).[8]

means that when we are considering any development process of biological or human development (including, of course, evolutionary as well as individual development), we must begin with its operative function—its organized end-result and how well or badly it works in the business of life. Then we can analyse it into its elementary components and search for its origins. Finally, we must study the operation of the process itself to find out how it *educes* its end-result out of its original components—in more general terms, how it actualizes its potentialities. Only then shall we be in a position to set about improving it.

The first and obvious fact about human development is that it is not a mere unfolding of a miniature model; the developing human being passes through a series of radically different stages—infancy, childhood, boy- or girlhood, adolescence, maturity, each of them demanding different educational treatment. Yet many educational systems have insisted on treating the child as a miniature man, and others as so much blank or plastic material, to be written on or moulded at the educator's will.

In reality, the development of man, like that of all other organisms, is what biologists call *epigenetic*. It is a cybernetic process full of feedback mechanisms, and produces both complexity and emergent novelty. The modern science of development has shed the title of Embryology in favour of Epigenetics.

To-day we are beginning to explore the mechanisms by which the genetic code inscribed in the chromosomes of the egg is translated, through the co-operative interaction of the genes and their environment, into bodily and mental organization, and are discovering various of the principles at work. One of the most important of these is what Waddington[15] has called the *canalization* of development into a number of channels, each leading in a definite direction towards a specific kind of end-result, while any departure from their "right" course is automatically corrected. They thus have a high capacity for self regulation—perhaps self-direction is the better term.

Such processes Waddington calls *creodes*, meaning, by creode, "a pathway of change" which is equilibrated, in the sense that the system tends to return to it after disturbance. Some creodic systems provide alternative but sharply distinct pathways: thus, the creode concerned with the development of our reproductive organs can be switched by means of the sex-hormones into one or other of the pathways leading to normal male or to normal female organization. And, of course, many creodes can be somewhat deviated by the environment without giving an abnormal result: sunlight can deviate our skin-colour from pale to dark, exercise can lead to muscular development.

Other creodic canalization systems may be more plastic and permit the organism to wander off in various directions over the developmental landscape. This applies especially to the behaviour-systems of higher vertebrates, whose learning capacities permit them to adjust their activities to their experience; and most notably to that of man. The creodic system concerned with human behaviour is so widely and deeply plastic that it not only provides for an extensive range of wandering and branching in later stages of development, but can be radically influenced at its early roots and in the main trunk of its growth.

It has to integrate competing and even conflicting basic drives and desires into some sort of wholeness. Integration can be prevented by depriving the child of some basic ingredient for his psychosocial development, as John Bowlby[2] has shown with maternal deprivation. It can be traumatically distorted by internal conflict culminating in repression, which then leads to the projection of one's own guilt and repressed aggression outward on to others, or sometimes inward on to oneself. An excess load of infantile guilt may produce anything from a cruel superego and a harsh and unforgiving morality to an inferiority complex and an over-meticulous conscience. A load of sexual guilt at adolescence coupled with frustrating failure to achieve satisfactory social adjustment may lead to an amoral and asocial bored indifference, to a retreat from the social world into neurotic depression or, at the other extreme, to an assertion of the ego's significance by violent and anti-social actions: meaninglessness is the parent of delinquency. Clearly educational systems cannot supply psychoanalytic treatment, nor can they take over from parents the job of looking after the early development of

their babies. But they can do much to correct infantile distortions, to bypass adolescent frustrations, and to replace meaninglessness with significance. They can do so by providing opportunities for fulfilment and satisfaction in all sorts of ways, and, in particular, through activities which make boys and girls feel that they matter that they mean something to themselves and other people.

In general, educators should try to provide children with what I may call integrative creodes —developmental processes which will steer themselves towards more effective integration of knowledge and behaviour. This does not just mean the "moral education" that conventional educational systems aspire to give: it means providing children with more effective systems of canalizing their own moral, intellectual and spiritual development.

How to achieve this aim properly is a matter for much research and experiment, though clearly a good deal can be done to avoid frustration by providing channels of fulfilment within the educational system. Group projects can obviously help in giving a feeling of signifiance. But we want to know what sort of project and what type and size of group gives what degree of significance to what kinds of boys and girls. Already, both sociologists and ethologists are busy studying the general problem of social groups and their working; the time is ripe for educators to combine with their colleagues in tackling the special problem of the role of groups in education.

Group Behaviour

Ethology is giving a useful lead, by studying the formation and function of behavioural bonds in animals. In higher vertebrates, such as geese, jackdaws, monkeys and chimpanzees, such bonds involve emotions: so they do in ourselves, but in ourselves they can be reinforced by empathy, which seems to be present only in rudimentary form in animals. They include the bond between parent and offspring, the pair-bond tying mated birds together, the gregarious bonds in bird flocks or caribou herds, the social bond operating in a wolf pack, rookeries or baboon communities.

Some important points are emerging. First, all behavioural bonds have a genetic built-in basis, but only develop to full effectiveness through some sort of learning under the impact of experience. Thus, the original basis of the offspring-parent bond in monkeys, as Professor Harlow has shown, is merely the experience of something soft and furry: but to convert it into an operationally effective bond between a mother and her offspring, a long further chain of reciprocal experiences is needed.

Secondly, close and intimate relations between individuals usually involve an element of hostility, and therefore of aggression as well as of attraction. This is true of the relations between members of a mated pair as well as between members of a social group, and often between parents and their young. Thus, in what is often misleadingly called the courtship of birds, the attitudes of the mates as they approach each other are the resultant of a mixture of attraction, attack, and escape. As ethologists like Lorenz[10] and Tinbergen[13] have so beautifully shown, these attitudes have then been (metaphorically) seized upon by natural selection and turned into formal displays serving as moves in the reproductive game. Or, to take an example from a mammal which (like man) is both social and fierce, fights between wolves are prevented from leading to a really serious outcome by means of a special ceremonial attitude. If a younger and weaker wolf is in grave danger during a fight, he crouches and presents the vulnerable back of his head to his more powerful enemy; and this automatically inhibits the aggressive urges of the attacker. The basis for this socially valuable bit of behaviour is built-in to the genetical equipment of the species.

All such behaviour has been largely ritualized —turned into formal activities of functional value; and my third point is that in this process of ritualization, the element of aggression is made to serve some useful purpose, whether by redirecting it against other objects or by utilizing its energy in the performance of the bonding ceremony. Rituals are thus methods for transforming frustrating conflict situations into biologically significant activities. Clearly, something similar could be achieved in education. Many conflicts could be acted out in ritual form, many

activities could be given added significance by putting them in a formal setting.

The Adolescent Crisis

All primitive societies cope with the adolescent crisis of their young people by elaborate *rites de passage* laden with significance. Can our over-intellectual and over-technological societies not devise something similar? Could not all the adolescents of one age-group be called on to undertake some challenging individual exploit, as with the boys at Gordonstoun? Could not another age-group be called on to embark on group adventures and projects; and yet another to undertake some sort of service to the community? Could not the end of school life be celebrated in a more formal and expressive way than now?

The broader question proposes itself: cannot the passage to the adult stage be linked with the larger community of the nation and the world, in something which would really deserve the title of a national, or even international, service? The rudiments of such a service are there, in organizations like the Peace Corps, the Organization for Relief and Development, and the Youth Conservation Corps, in exploration societies and travel studies. We should get on with the job of seeing how to link them all up in some flexible and imaginative scheme which would give outlets for many types, would provide some sense of significance and direction to many chaotic lives and would become an important part of the country's educational system.

In this, as in many other ways, our education could be made a more integral process, and the split between its two functions of intellectual instruction and professional training on the one hand, and moral education and character-formation on the other, which began over two thousand years ago with the rise of the Sophists in Greece, could be bridged.

An Education Council

Education, in spite of all the hot air expended in lip-service to its importance, still has an unfortunately low status in our competitive technological world. Yet it has a crucial and very special role to play in helping the technological world through its present crisis. If it is to raise its status, the educational profession should devote a great deal of thought and energy to understanding the nature of that crisis and devising methods to meet it. As a result of the knowledge explosion of the last hundred years, the evolutionary process, in the person of post-Darwinian man, is at last becoming conscious of itself; it is time that the educational process, in the person of the educational profession, should become conscious of itself as the essential psychosocial organ for transmitting and transforming human culture.

A first step, it may be suggested, would be the establishment of an Education Council, on a par with the Arts Council, the Medical and Agricultural Research Councils, and the D.S.I.R., though with its own special functions. If the Government were chary of giving it the same financial aid as the other Councils, the educational profession ought to set it up on its own, confident that, once in being, it would speedily prove itself and attract official support.

The overriding question for such a body to consider would be this: how can education help in bringing coherence, significance and direction into our chaotic, fragmented, and bewildered world? It could do so in two distinct but interdependent ways, one primarily concerned with knowledge and the handling of outer experience, the other with personality and the handling of inner experience. The first aims at providing a meaningful picture of the outer world and a coherent pattern of ideas to help in understanding it and our relations with it: The second at promoting the development of a meaningful and coherent inner world, and providing a pattern of activities and opportunities to help in achieving it. Various projects of this sort are already being initiated. Thus, the Gulbenkian Foundation is organizing a series of conferences on education. The *Universities Quarterly* contains a report on proposals made at one of these conferences, for a Social Science Research Council which would tackle the problems of higher education in Britain. The new University of Sussex is hoping to undertake a large-scale research investigation of its own operations. And we have had the provocative Crowther Report.

An obvious and immediate task is to hammer out the details of a general curriculum which, as I have suggested, would reflect the unitary vision

provided by modern science and learning. Sample text-books should be prepared, and consideration given to teaching aids and to learning through projects. Such a curriculum would bypass the split between Sir Charles Snow's Two Cultures; its very unity would give it a new dynamism, with sciences and humanities reinforcing each other instead of being driven into mutual hostility. Critics like Dr. Yudkin claim that this is impossible and would involve "the falsely optimistic idea of an age of Leonardos". On the contrary, I believe that it is perfectly possible to give every normal boy or girl a general understanding of what science and history and literature and industry are about: this could be achieved by the age of fifteen or sixteen though it would be much easier if secondary education were extended to seventeen or eighteen. And the first year or so of college or university life should supplement necessary specialization with some reasonably advanced study of complementary fields. Throughout, there would be emphasis on the role of concepts and techniques of thought and expression as mental tools and machinery enabling one to comprehend external reality more readily and more satisfactorily; on projects as well as on customary instruction; and on making the process of learning and understanding enjoyable.

In relation with this major theme, one subgroup might study examination systems, with particular reference to devising methods of testing understanding as well as knowledge, and of assessing creativity and general capacity as well as academic performance; another might look into ways of preventing the growth of antirational ideas and superstitions; another would deal with the question of teaching aids;* and yet another with the problem of ensuring an adequate supply of top-level minds for the nation's business, administration and culture.

The second major study would be concerned with inner development—how the educational system could encourage the growth of integrated personalities, at war neither with themselves nor with society. Such a system would bypass the split between intellectual and moral education. In order to achieve this, the educational process must help in the resolution of inevitable conflicts. It must provide opportunities not only for enjoyment, but for fulfilment of many kinds, especially for consolidating the boy's or girl's identity and for achieving a sense of significance. Such a study will be difficult. It will involve calling for help from a whole range of ologies—anthropology, ethology, psychiatry, child psychology, physiology. It will involve facing the problem of evil and what theologians call original sin, and reconciling some violently opposed points of view. But if it is successful it could lead to new conceptions of the functions of education and a revolutionary overhaul of its methods. It could also enable education to affirm its importance as a transformer of society as well as a transmitter of culture; for the products of such a personally fulfilling education would undoubtedly press for the establishment of a real-life Fulfilment Society.

Then there is the exciting territory of non-verbal and non-intellectual education to be explored and exploited.† There is the problem of education's link with the arts.‡ Our educational system is now being called on to supply the nation with large numbers of scientists and technicians; should it not be required to furnish a similar quota of artists, architects, sculptors, decorators and designers? There is the question of giving schoolmasters (and, of course, schoolmistresses) opportunities for research and creative work. There is the tricky problem of tests—intelligence tests, open-ended tests, aptitude tests, personality tests. There is the problem of how far the practice of meditation can replace or supple-

* Some years ago when I visited the Great Mosque of Kairouan, the oldest university in the Western world, I saw not only the traditional method of instruction, groups of students listening to a learned man by a pillar in the mosque itself, but was also shown with pride the modern improvements, in the shape of little classrooms round the great courtyard, each equipped with a blackboard. I had never before realized the revolutionary impact that this teaching aid must have had on the educational process. I suspect that the impact of our modern teaching aids—films, closed-circuit TV, radio relays, and teaching machines will be even more revolutionary.

† For an imaginative treatment of this subject, see Aldous Huxley's Utopia, *Island*; and for an interesting experiment in art appreciation and art education, in which pupils learn to grasp the "perceptual unity" of a painting or a situation when illuminated for a tenth of a second, see Hoyt Sherman's *Drawing by Seeing*.

‡ As a recent exhibition at the U.S. Embassy in London demonstrated, the study, appreciation and practice of art are now becoming an integral part of American programmes of higher education.

ment formal religious services, prayer periods and scripture lessons.

And there is the world problem. The world has become one *de facto*. It must achieve some unification of thought if it is to avoid disaster (let alone proceed to political unification), and this can only come about with the aid of education. We must remember that two-fifths of the world's adult population—700 million grown men and women—are still illiterate, that the world's provision for education at all levels is lamentably inadequate, and that the underdeveloped countries are all clamorously demanding more and better education.* Britain, as an ex-colonialist country and the senior partner in the Commonwealth, has a special responsibility for meeting these demands. Unesco is also doing a great deal in this urgent matter.

Beyond all these and many other particular problems there is the great question-mark of so-called Adult Education. With the combination of more automation, compulsory leisure, and greater spending power, we shall soon be faced with the task of extending our educational system to meet the needs of the entire adult population. Education in the ordinary limited sense seems destined to become only a part of a comprehensive and continuing process. Perhaps we should look forward to the establishment of a National Education Service. In any case, the prospect opens up all manner of exciting possibilities, which it is the duty and the privilege of the educational profession to explore.

Obviously, university Departments of Education will be required to enlarge their functions, and they will become the academic agencies of the country's educational system. By fully establishing the claims of education to equal rank with other subjects in the university curriculum, both as a field for research and a course of study as well as a training for a job or a career, they could do much to improve its public image.

But these are matters of detail. For, make no mistake, the basic task before the educational profession to-day is to study and understand the evolutionary-humanist revolution in all its ramifications, to follow up its educational implications, and to enable as many as possible of the world's growing minds to be illuminated by its new vision of human destiny.

It is a strange and rather disturbing fact that in the one-volume abridgement of Toynbee's monumental *Study of History*[14] there is only one short section on education, dealing merely with the impact of modern democratic theories on the subject. If the educational profession rises boldly and successfully to meet the challenge of the new knowledge and the new vision which it reveals, new histories of mankind will not only devote much more attention to education as a major function of man in society, but will single out our age as the historical moment when education was reorganized as an integral part of the psychosocial process, and became pre-eminent among all the agencies concerned with human destiny.

* There is some danger of regarding education as a panacea for emergent nations. The cost of the immediate educational facilities demanded is often too high. Attention should also be given to schemes for economic development, which will enable an adequate educational system to be set up eventually.

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